

## ATOMIC LAYER DEPOSITION FOR TURBINE COMPONENTS

### ABSTRACT OF THE DISCLOSURE

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A method and superalloy component for depositing a layer of material onto gas turbine engine components by atomic layer deposition. A superalloy component may have a ceramic thermal barrier coating on at least a portion of its surface, comprising a superalloy substrate and a bonding coat; and  
10 aluminum oxide ( $\text{Al}_2\text{O}_3$ ) layer may be deposited on top of an yttria-stabilized zirconia layer and form a bonding coat by atomic layer deposition. The yttria-stabilized zirconia layer may have a plurality of micron sized gaps extending from the top surface of the ceramic coating towards the substrate and defining a plurality of columns of the yttria-stabilized zirconia layer. Also, atomic layer  
15 deposition may be used to lay an aluminum oxide ( $\text{Al}_2\text{O}_3$ ) layer over a tantalum oxide ( $\text{Ta}_2\text{O}_5$ ) layer on a silicon-based substrate. Using atomic layer deposition to coat the gas turbine engine components permits conformal coating of the columnar surface to permit gap expansion and contraction without sintering of the columnar surface or spalling of the coating, and form an oxidation resistant  
20 bonding coat.